DOCUMENT RESUME

ED 431 036 TM 029 991

TITLE	Investing in Learning: A Policy Statement with Recommendations on Research in Education by the National Educational Research Policy and Priorities Board.
INSTITUTION	National Educational Research Policy and Priorities Board (ED/OERI), Washington, DC.
REPORT NO	PPB-1999-6308
PUB DATE	1999-06-00
NOTE	56p.
PUB TYPE	Reports - Evaluative (142)
EDRS PRICE	MF01/PC03 Plus Postage.
DESCRIPTORS	*Agenda Setting; Educational Change; Educational Improvement; *Educational Research; Elementary Secondary Education; *Needs Assessment; Research Methodology; *Research Needs
IDENTIFIERS	National Educational Res Policy and Priorities Bd

ABSTRACT

This document is the first comprehensive statement on research in education issued by the National Educational Research Policy and Priorities Board (NERPPB) that draws on systematic inquiry over the past 4 years. Recommendations are made for legislative and administrative changes to improve research, development, and communication of research activities sponsored by the federal government. Two important trends provide the context for these recommendations. The first is the increasing number of students "at risk" in the school districts that are least able to marshal the resources to help them. The second is the accelerating growth of information technology. Two conclusions that emerge from educational research are that research has a proven record in educational improvement and that federal support for education is an investment that must be expanded. Twenty-three specific recommendations are made to work toward the following goals: (1) priorities are set and activities are problem-centered; (2) high standards of quality are created and upheld; (3) work is collaborative and rigorous; and (4) the research mission is congruent with resources. (Contains 16 references.) (SLD)

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National Educational Research Policy & Priorities Board

Investing in Learning: A Policy Statement with Recommendations on Research in Education by the National Educational Research Policy and Priorities Board

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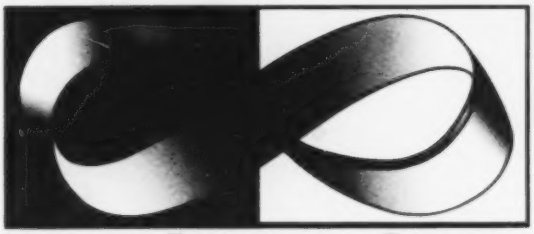

NATIONAL EDUCATIONAL RESEARCH
POLICY & PRIORITIES BOARD

Investing in Learning: A Policy Statement with Recommendations on Research in Education by the National Educational Research Policy and Priorities Board

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U.S. Department of Education

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National Educational Research Policy and Priorities Board

The National Educational Research Policy and Priorities Board (NERPPB) is authorized by the Educational Research, Development, Dissemination, and Improvement Act of 1994. The Board works collaboratively with the Assistant Secretary for the Office of Educational Research and Improvement (OERI) to forge a national consensus with respect to a long-term agenda for educational research, development, dissemination, and the activities of the Office. The Board regularly reviews, evaluates, and publicly comments upon the implementation of its policies by the U.S. Department of Education and the Congress.

The Secretary of the U.S. Department of Education appoints members of the Board. They represent the research community, school-based professional educators, and individuals who are knowledgeable about the educational needs of the United States.

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Foreword

The National Educational Research Policy and Priorities Board (NERPPB) is charged by Congress to advise the United States on the federal educational research and development effort. Since its establishment by the Educational Research, Development, and Improvement Act of 1994, the Board has undertaken systematic investigation on the dimensions and scope of educational research and development, much of which has been carried out under the auspices of the Office of Educational Research and Improvement (OERI) of the U.S. Department of Education and by its predecessor, the National Institute of Education. We have emerged from this study more firmly convinced than ever of the importance of sound, cumulative research in education.

At the same time, we must acknowledge that there are serious shortcomings in the present research and development system in education—in its funding, structure, organization, approaches, and even its goals and objectives. Apart from our own firsthand observations of OERI and other federal agencies, we have consulted widely with the key stakeholders—educators, families, and researchers—about the changes and improvements that will correct our course and lead us to the advancements that we seek.

This document is the first comprehensive statement on research in education that draws on our own systematic inquiry over the past 4 years. We have made recommendations for legislative and administrative changes that we are convinced are necessary to improve the research, development, and communication of research activities sponsored by the federal government. We hope these findings will be helpful and constructive, particularly in light of the consideration by this Congress of the authorization of the Office of Educational Research and Improvement.

Readers are encouraged to respond and to address their comments to

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Acknowledgments

The Board extends its thanks to the many individuals and organizations that have generously shared their expertise and insights with us over the years. Special thanks to Emerson Elliott for assisting in the formulation and organization of this policy document.

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Summary of Recommendations

Goal: Priorities Are Set and Activities Are Problem-Centered

1. *Student achievement*—The priority for research in education must be a high level of achievement for all students, and, within that domain, the initial emphasis should be on *reading and mathematics* achievement.

2. *Reading, second language learning, and mathematics*—Recent reports from the National Research Council, *Preventing Reading Difficulties in Young Children*, and *Improving Schooling for Language-Minority Children: A Research Agenda*, synthesize strong bodies of research knowledge. A similar study on mathematics is currently under way. In each case, research is needed now to analyze how the results of our knowledge can be implemented in school programs and what factors lead to success or to difficulties. In reading, research is needed on how students become facile at reading complex text as they transition to advanced academic subjects such as history, social science, mathematics, and science. Research in both short- and long-term effects of specific education interventions for English language learners is needed, as well as techniques of assessment to measure competence, and transition points, from the first oral language to English; from oral language to literacy; and from literacy to the academic discourse of specific disciplines. In mathematics, research is needed on why students have so much trouble making transitions (e.g., from concrete objects to more abstract ideas), understanding formal representations, multiplicative reasoning, and essential mathematical and statistical concepts, such as chance, randomness, and probability.

3. *Organization for learning out of school*—To take advantage of different learning environments in which children from impoverished backgrounds often display more competence than in school settings, research is needed to design and test different models of after-school and summer programs to motivate, engage, and benefit children of low-income families. Work is also needed on types and features of after-school opportunities that most effectively motivate academic achievement and positive self-estimations; and how to design and test different models of

collaboration between schools and community groups dedicated to providing strong learning environments for poor children.

4. *Organization for learning in school*—Retention, pull-out remediation, tracking, and segregated special education programs that stratify by race, class, and gender opportunities to learn do not result in high achievement for all students. A more complete inventory of knowledge about effective practices for teaching academically challenging curricula with groups is needed, both for school populations in general, and for heterogeneous groups in particular. Research is needed on questions of time for children to master challenging curricula, supportive school structures, and expectations for the breadth and depth of content. Within each of these is the question, do students from middle-income families, as well as from low-income, ethnic, and linguistic minority backgrounds, benefit from each organizational practice? An important area of inquiry is whether there are academic benefits to classroom diversity—does diversity improve subject-matter learning?

5. *Linking changes in teaching practice with improved student learning*—Information is needed that can guide teachers and institutions who want to change their educational practice, particularly to reduce inequities in the opportunities of students who differ in socioeconomic status, ethnic background, and gender to learn successfully. This is especially important regarding the achievement of deep intellective competence advocated in current educational reforms. Such research would examine fundamental issues about the nature of teaching and learning, including, but not limited to, the importance of the skills and knowledge of teachers. We need to expand our knowledge and understanding of teaching practices, including teaching tools, such as assessment, that are successful with students who bring different cultural resources to their own and others' learning. Research would examine, much more so than in the past, issues of what it takes to do effective and successful teaching with diverse populations of students.

6. *Linking teachers' professional development and teaching practices*—Research is needed to understand what effective teachers do and how they do it. Successful teaching involves not only the exercise of skills and application of knowledge but also flexible improvisational adaptation in the classroom. Research is needed to understand the roles of increased knowledge and comprehension of subject-matter concepts and methods, the role of thorough understanding of the curriculum in the subject both

at the level one is teaching and in relation to other disciplines and grade levels, as well as the role of understanding students' learning in improving teaching practice. Research should also investigate how the structure of teachers' work supports or hinders their "on-the-job" learning and what kinds of abilities are learned in particular situations that can transfer to other settings.

7. *Understanding and supporting successful professional development*—There is need for a better understanding of teachers' development as "professional learning," and of teaching as a "learning profession." The model of learning how to teach, which is prevalent today, namely, that knowledge goes in during teacher education or professional development and then comes out in the teachers' own classrooms, does not account for the engagement of teachers themselves in improving the practice of their profession. What teachers need to learn to put reforms in place is not separable from their actual teaching practices or from the development trajectories of their careers. Research needs to examine ways in which people of diverse cultural, ethnic, and socioeconomic backgrounds are attracted to careers in teaching. How can professional development resources help support diversity in the teaching profession as well as improve practice? Further research on teachers' communities of practice is needed, building on findings that norms of responsibility and collegial efforts at professional problem solving are the most critical factors in improvement of teaching and learning.

Goal: High Standards of Quality Are Created and Upheld

8. *Standing panels*—Standing panels should be established to review proposals for each OERI institute. These would be comprised of 25 to 30 members, but with some overlapping membership, so that problems that cross boundaries can receive informed attention and that members of one panel with special knowledge could be invited to serve on another.

9. *Panel membership*—Panels should represent a broad range of perspectives. They must include members with strong disciplinary and methodological expertise. Across OERI panels, gender, race, ethnicity, and geographic diversity must be respected. Panel members should generally be nationally recognized figures.

10. *Standards for panelists*—The Board continues to support peer review standards adopted by OERI, with Board approval, which stipulate that all reviewers meet three criteria: demonstrated expertise, including training and experience in the subject area of the competition; in-depth knowledge of policy or practice in education; and in-depth knowledge of theoretical perspectives or methodological approaches in the subject area of the competition.

11. *Distinguishing between field-initiated and directed competitions*—OERI should distinguish between field-initiated competitions and those that are directed, rather than trying to combine the two.

12. *Funding for peer review*—The allowable percent of funds to support peer review should be increased so that the necessary standing panels and logistical support can be provided.

13. *Definitions*—The term "research" should be more narrowly defined than it is in the 1994 law so that the boundaries of focused competitions for research can be limited. Research should emphasize basic research in education as well as investigations, experiments, and inquiry to develop new knowledge or apply tested knowledge. It should exclude development, planning, and demonstrations. The term "national significance" needs to be clarified through regulations or in legislative language so that reviewers understand that it includes research opportunities, not only important problems identified by educators.

Goal: Work Is Collaborative and Rigorous

14. *Collaboration across federal agencies*—The Assistant Secretary for OERI should extend efforts to join with other federal agencies, and perhaps foundations, to collaborate on common agendas.

15. *Coordination of research within the U.S. Department of Education*—The Secretary should encourage, and the Assistant Secretary for OERI should provide special attention to performing a visible and constructive role in collaboration and coordination of education research within the Department.

16. *Linking ongoing research and practice-related efforts*—The Assistant Secretary should develop constructive means through which OERI, the

Research and Development Centers, and the Regional Educational Laboratories can function closely together to maximize their collective impact.

17. *Synthesis activities*—OERI should support synthesis activities across all-important fields of educational research, summing up progress continually and drawing implications for policy and practice.

18. *OERI staff*—The Assistant Secretary needs to determine the responsibilities most appropriate to accomplish the research functions of OERI, both to advance its work and to attract, retain, and continuously nurture staff with the requisite training and opportunities.

19. *Collaborative problem-solving research and development*—OERI should begin development of a new design for research that would focus explicitly on solving specific current problems of practice and at the same time be accountable for developing and testing general principles of education that can "travel" to locations beyond those in which the research is done The central idea is to develop a system of support for projects in which professional researchers and professional educators share in the accountability for achieving success in improving educational practices and outcomes. These projects may also include program developers, curriculum specialists, or policy specialists. Initially, this effort might be launched through a "working group" to assist in designing specific parts of the priority research agenda for which this model would be best suited, the role of OERI and outside contractors or grantees, coordination across multiple sites, expectations as to scale and length of commitment and the like.

Goal: Mission Is Congruent with Resources

20. *Funding research in education*—Funding for educational research must be increased dramatically. An interim target should be to reach the level of 0.5 percent of our nation's expenditure for elementary and secondary education, about $1.5 billion annually, which was the amount proposed by the President's Committee of Advisors on Science and Technology. It would be feasible to reach this target over a 5-year period.

21. *Aligning resources and mission*—Over the next 5 years, OERI should work to make the resources and missions better aligned. The missions must be matched with money.

22. *Research supervision*—Some focal point should be created by Congress for research leadership that can span across administrations.

23. *Allocation requirements*—The allocation provisions for institutes and for types of support in the Educational Research, Development, Dissemination, and Improvement Act of 1994 should be removed.

I. Introduction

Research in Education

America's students fall far short of academic achievement levels that policy leaders, parents, the public, and the media believe are necessary to equip them for living, for active citizenship, and for productive employment in the 21st century. This is perhaps the most frequently repeated message Americans hear, see, or read about education. Rarely, however, is our nation told that research has proved that it can make a difference in the practice of education so that more students will learn effectively. Yet that has been the record. Members of the National Educational Research Policy and Priorities Board believe that investments in education research are justified, and, more important, that commitment to *substantial growth* in federal support of these investments is urgent. Without these investments, guidance for education policies and practices is too often left to uninformed opinion and unreasoned prejudice.

The Board has reached these conclusions as a result of experiences shared by the members since its establishment in March 1995. It has carried out the duties assigned in law, many of them in collaboration with OERI, commissioned studies and evaluations, and consulted with many individuals. Representatives of scholarly organizations, schools, advocacy groups, and governmental agencies have briefed the Board about how research is carried on, what findings have been reported and analyzed, and how those findings have been put to use. Established under the Educational Research, Development, Dissemination, and Improvement Act of 1994, the Board has had responsibility to develop policies and priorities for research in education. This policy paper is the Board's first comprehensive statement on the federal effort in education research.

Two important trends provide the context for the nation's challenge to helping our youth reach acceptable educational performance standards and outcomes. The first of these is the rapid increase in the number of students "at risk" in school districts that are least able to marshal the human and financial resources to meet their needs. The demographic and geographic characteristics of projected growth in the youth population over the next 30 years suggest that virtually all of it will be concentrated in these "at risk" areas. But one should not suppose that our national challenge is confined to children at risk in deteriorating urban school systems. As the recent Third International Mathematics

and Science Study (TIMSS) has made clear, deficiencies in mathematics and science skills and knowledge extend to all students at all levels of relative proficiency, including those who live in well-financed districts with mostly majority population.

A second important contextual trend is the accelerating onrush of information technology. Already reaching into many aspects of the lives of students, the new technologies are increasingly shaping formal education, for better or worse, and reemphasizing disparities between the "haves" and the "have-nots." This trend is not simply a matter of access to computer hardware and software, vital as these factors are; it is also about the critical need to plan and integrate new technology into teaching and curricula, so as to expand and extend student learning.

These interacting trends represent a problem of immense national significance. The national educational enterprise in its many forms is widely and correctly understood to be a central device for the development of the knowledge, skills, and perspectives necessary to the success of our economy and the well being of our society. Education is also part of the glue that helps to bind us together as a community and a bridge across our many differences. Meeting these new challenges requires more than good will, energy, and resources. It also requires putting what we know to work and expanding our knowledge base so that our capacity to meet the challenges will be expanded. Trying to implement our hopes and our goals without careful research, testing, and development is likely to increase our frustrations without improving our performance.

In no way is research in education a quick and effortless path to success. Over the years, there have been many hard lessons to be learned. Educational improvement occurs slowly and in small increments no matter how powerful the research base behind it. Deep disagreements among prominent researchers are continual and perhaps inevitable. Professional educators have rarely become enthusiastic consumers of research. Weak designs and measures, combined with these professional doubts and disputes, have produced too many research results whose values and political implications are more prominent than their scientific validity. The educational research system has had powerful constraints and limitations on it, which have hindered numberless researchers and projects. The wonder is that educational researchers have been able to accomplish what they have.

Yet the accomplishments of research in education have been significant and their influence on education often wide. This perspective has been summarized in the report from a June 1998 conference on *National Directions in Education Research Planning,* which the Board sponsored jointly with OERI:

> Educational research has been used time and again, at critical junctures, to improve teaching and learning. Important examples range from John Dewey through constructivism, to Edward L. Thorndike through behaviorism and educational testing. . .

Education research has supported the design and evaluation of many governmental programs at all levels. Studies of learning and school organizations have had a major impact on teaching, assessment, and education reforms. Three recent reports from the National Research Council (NRC) that sum up what has already been learned and how it might be used in education include: *Preventing Reading Difficulties in Young Children*; *Improving Schooling for Language-Minority Children: A Research Agenda*; and *How People Learn: Brain, Mind, Experience, and School.* A recent, multifaceted set of research reports, the Third International Mathematics and Science Study (TIMSS), is the latest, most comprehensive, and most significant of a generation's progress in building comparative international assessments of learning and instruction. The widely acclaimed "Success for All" and projects of the New American Schools are demonstrating the practical and powerful effects that research can have when it is systematically applied in the classroom.

Our first conclusion from these and many other examples is that *research has a proven record in education.* Our second is that *federal support for education research is an investment that must be expanded several-fold.* Others have come to this second conclusion as well. For example, in a 1997 report, a panel of the President's Committee of Advisors on Science and Technology (PCAST) called for sharp increases in education research appropriations—reaching 0.5 percent of U.S. spending for elementary and secondary education. The report of the *National Directions* conference agreed that greater funding for research in education would be wise and productive:

> The prospect is that more confidence and opportunity could pay off handsomely, if the support is strategically provided.

The National Educational Research Policy and Priorities Board not only concurs, it has created this policy statement to describe critical elements of a strategic design for the federal government's role in education research.

Role of the National Educational Research Policy and Priorities Board

Congress created the Board as an external policy setting and advisory body for research in education. The Board sets priorities and approves standards. It also conducts reviews of OERI work, serves in a liaison capacity with the education research field and the public, and has responsibilities to strengthen the education research and development system. It enjoys substantial independence in gathering information, commissioning consultants, meeting with representatives of the education research system and consumers of that system, and, perhaps most importantly, communicating with the American public and Congress about education research. Among its specific responsibilities are the following:

- provide guidance to Congress in its oversight of OERI;
- review regularly, evaluate, and publicly comment upon, the implementation of Board recommended priorities and policies by the Department and the Congress; and
- advise the (people of the) United States on the federal educational research and development effort.

The operations of the Board are required to be collaborative—carried out in concert with the Assistant Secretary as well as with researchers, teachers, school administrators, parents, students, employers, and policymakers. Indeed, the concept of collaboration is emphasized both in the statement of Board responsibilities in the law (such as in policy and priorities setting) and in the categories for Board appointments mandated in the law, namely:

- education researchers, nominated by the National Academy of Sciences;
- outstanding school-based professional educators; and

- individuals who are knowledgeable about educational needs—parents, chief state school officers, local education agency officials, principals, members of state or local boards of education or Bureau of Indian Affairs school boards, and individuals from business and industry.

Ex officio members in addition to the Assistant Secretary for OERI include the directors of research for the Department of Defense and the Department of Labor; the directors of the National Science Foundation, the National Institutes of Health, the National Endowment for the Arts, and the National Endowment for the Humanities; the Librarian of Congress; and the director of the Office of Indian Education Programs at the Department of the Interior.

It is now 4 years since the first meeting of the Board. During that time the Board has carried out its responsibility to approve standards for review of grant proposals, evaluation of exemplary and promising practices, and evaluation of OERI's work. It has examined and made recommendations on the peer review system at OERI, crucial to ensure high-quality work. It has collaborated with the former Assistant Secretary to set initial priorities. It has reviewed solicitations for regional educational laboratories, the research and development centers, and other major initiatives. The Board members have also stepped back to evaluate their functions more broadly, both to determine the effects of what members have done and to assess directions for education research in the future, especially as the time comes for reconsideration of the authorization of OERI's research and development authorities. The following pages describe the findings and conclusions from these studies (section II) as background for Board goals and recommendations (section III).

II. The Board's Findings

The Board has conducted its efforts with a view of education research, development, and dissemination as bringing opportunity and promise to learning for America's youth. As the Board has surveyed the field of education research, it has tried to identify the major issues in the existing system—the longstanding problems and the increasing need for better returns from the investments in the system. It has grouped these in terms of resources, balance and linkage across the system, and processes.

Resources

Longstanding problems in education research start with insufficient resources. Limited funds have been spread thinly over a large number of topics and problems, rather than concentrated on fewer issues. OERI's national research institutes, created in 1994 to re-focus education R&D on important educational topics and problems, are a prime example. Notwithstanding some bright spots, the institutes lack sufficient internal staff to mount credible programs consistent with their mandates for comprehensive and high-quality work and to provide national leadership on critical issues. This means that the "critical mass" found in other research institutions to be necessary for an effective, high-quality program is missing. The Board's concern about critical mass extends to the national educational research and development centers, which in many instances have too few resources for the work and leadership expected of them. The regional laboratories, as well, have immense formal missions, but only modest resources to achieve them. Some of these institutions have addressed the critical mass problem by aggressive efforts to obtain resources from other sources, but they all still face a mismatch between ambitious missions and limited resources to meet those expectations.

If the quality, utility, and resources for education research are to improve, more effort, focus, and resources will be needed to strengthen the supporting infrastructure in three respects:

(1) The "demand" for research should be strengthened. Building effective demand will require a substantial effort to educate teachers about the value and use of education research. That effort will succeed, however, only if educators are participants in the planning and execution of research.

(2) More resources can be used to attract new, highly qualified scholars from many disciplines to educational research and its issues. Lack of resources and prestige now inhibit such recruiting.

(3) The institutions that undertake the critical work will need to be selected on merit, nurtured with sustaining resources and the demand for quality, and rigorously evaluated for performance.

The National Educational Research Policy and Priorities Board is not alone in its conclusion that education research is shamefully underfinanced. In 1997, the Panel on Educational Technology of the President's Committee of Advisors on Science and Technology (PCAST) made several recommendations to improve the quality of education in all subject areas. The report did not focus only on technology as a topic of study, but as a means to strengthen content and pedagogy in education, enhance professional development, and increase student learning. The Panel called for a large-scale program of rigorous, systematic research on education in general and educational technology in particular. It recommended an investment equal to at least 0.5 percent of our nation's expenditures for elementary and secondary education—about $1.5 billion annually—a five-fold increase over what the Panel identified as the current level. That figure was contrasted with the pharmaceutical industry's investment in research of an amount equal to 23 percent of all U.S. expenditures for prescription and non-prescription medications.

Balance and Linkage

The involvement of teachers and other education professionals in knowledge-building and implementation activities is stimulating new thinking about the design and conduct of research in education. It is increasingly clear that teacher acceptance of and success in revised practice is strengthened by understanding and involvement. This realization is leading toward efforts to seek active participation of teachers, schools, and districts in the research and development planning, and conduct and evaluation process. Some refer to this as creating "learning organizations." In this role, the education professional community becomes vested in the objectives of the innovation and reform, provides helpful input in fitting concept with operational reality, and contributes a continuing basis for accountability and mid-course correction.

The span of activities authorized for OERI is very broad, from fundamental research through large-scale demonstration and effective communication of

knowledge and information to the practitioner community. But that very breadth carries consequences when the research investments that are needed to improve student learning are not congruent with task. The portfolio of the Department is aggregated in two areas: applied research and small-scale development; and communication activities. The Department conducts essentially no basic research, and is not deeply involved in large-scale development or demonstration, especially about comprehensive or standards-based reform. The cumulative science base supporting the applied agenda of the OERI and departmental R&D activities lacks clear visibility, which adversely affects its force and credibility. The OERI Institutes are contributing some of the important applied research aimed at comprehensive or standards-based reform, testing and assessment. The Department's participation in large-scale development has been generally modest. The pattern of foundation funding often mirrors the federal focus, although a few foundations are supporting large-scale comprehensive reform experimentation. Generally, foundations appear to give more focus to curriculum and teaching topics than the federal programs. It is the Board's impression that the fit and relationship between foundation and federal funding are more happenstance than intentional. The absence of substantial large-scale development activity aimed at critical problems with rigorous research and evaluation is noticeable. This concern is particularly strong in light of the continuing difficulties of scaling up small, promising developments that require systemic change for widespread success. Providing knowledge of effectiveness at a large scale is an important insulation against faddism and insufficiently tested ideas.

Turning to dissemination, OERI's work most frequently has followed traditional approaches, no longer believed adequate, which leave to those in need of exemplary practice and sound knowledge the burden of finding it. This is particularly true for those undertaking large-scale comprehensive reforms. Even with the Internet and other forms of user-friendly electronic access, the passive systems do not fully meet the needs of those with ambitious innovation agendas, and the volume of information can overwhelm the practitioners involved. The more intensive efforts appear to require a combination of traditional dissemination, technical assistance, and short-term applied research or problem solving. A new set of intermediaries and adjustments in existing organizations are emerging to meet these needs, and dissemination must be reconceptualized in this broader context.

The Board has learned that fundamental research—largely in the cognitive and neural sciences—is conducted in other federal agencies, most notably the National Institute of Child Health and Human Development (NICHD), the

Office of Naval Research, and to a lesser degree the National Science Foundation (NSF). There is also modest foundation support for basic educational research. The location and level of fundamental research is of concern in several different ways. It is not desirable that basic research be sponsored or conducted in one organizational framework, but it is important that such work be linked to the applied research and ultimate practitioner communities that will exploit and make use of its findings. Sound linkage requires that staff in applied research organizations are sensitive to implications of the findings and are qualified to design the applied and related basic research needed to push sound findings toward utilization. Such linkage requires continuing identification of application problems and unmet needs from practitioner and applied research communities. Efforts to link across organizational performers are occurring more frequently, such as recent planning work concerning a new initiative among OERI, NICHD, and NSF.

The research planning processes in Education are newer and less well articulated than those for Defense and Health. Department plans set forth broad goals and objectives, and do a particularly commendable job of relating research and development efforts to mission objectives. But they are unlike the Defense and Health counterparts in two undesirable ways. First, they are much clearer about the mission and application goals than about the research goals and priorities. Second, there is a strong sense in the defense and health cases that the science base is firmly rooted, and that there is a clear sense of direction and cumulative learning. Moreover, in those cases, the growing knowledge base is a powerful determinant of both future research and operational actions. There is no such comprehensive sense for education research and development. These differences are in part attributable to the huge difference in resources among the three agencies, which inevitably affects the style that has been adopted. But more than just staff and dollar resources are at issue; there is also the question of whether the education research and development program is an endless series of small applied research projects unrelated to an evolving critical set of knowledge bases or a cohesive agenda of cumulative knowledge-building. By this criterion, these other federal agencies are better developed.

Processes

The Board's review of the current education research system included specific attention to important processes by which agendas are set, support is mobilized, resources are allocated, and progress is achieved, assessed, and made known. The experiences and models in other federal R&D programs provide insights for assessment of OERI's work.

- *Balance of researcher initiatives with national focus*: The first area is agenda setting, in which two important objectives need to be harmonized. On the one hand, long experience suggests that R&D is most productive if researchers are given substantial latitude in initiating work on their own ideas or perceived problems, generally known as field-initiated research. On the other hand, there is a strong and continuing need to give the R&D agenda a sense of national focus and priorities aimed at the most important gaps in our knowledge and the most promising research approaches. OERI has adopted several devices to create the desired harmony, yet the national focus part of the balance remains weaker than it should be. Education lacks a process similar to that employed in NIH, for example, that could ensure a continuing dialog among OERI, the Institutes, Centers and Regional Laboratories plus other important education research institutions and sponsors about critical research problems and opportunities.

- *Respect for research as well as for policy decisionmaking*: A second issue centers on mobilization of support. Given the importance of federal funds in education R&D, garnering support means the involvement of the federal political process. Respect for the appropriate domain and responsibilities of the research community and political policymakers is both necessary and is accomplished in other federal R&D programs. Where it works well, all parties are engaged in setting broad objectives and parameters of the work, while leaving specific design and execution of the projects to the sponsoring agency and the research and practitioner communities.

- *Meeting high standards of quality:* The third issue is development of appropriate research methodologies and the establishment of standards of evidence to be applied to knowledge-building activities. More rigor is clearly desired and needed in education research. Traditional rigorous methodologies such as randomized experiments may not routinely be feasible, affordable, or appropriate in education research, though control group methodology has a continuing and important role in the clarification of uncertainty about critical research issues. Members of the Board believe that further efforts are needed to define appropriate research designs. The choice is not between randomized techniques and nothing at all. There is an appropriate level of rigor associated with the stage and purpose of the research being undertaken.

III. The Board's Goals and Recommendations for Educational Research

In the 1994 "Educational Research, Development, Dissemination, and Improvement Act," Congress set forth a powerful challenge for education research and for the National Educational Research Policy and Priorities Board:

> The Congress declares it to be the policy of the United States to provide to every individual an equal opportunity to receive an education of high quality . . . To achieve (that) goal . . . requires the continued pursuit of knowledge about education through research, development, improvement activities, data collection, synthesis, technical assistance, and information dissemination. While the direction of American education remains primarily the responsibility of State and local governments, the Federal Government has a clear responsibility to provide leadership in the conduct and support of scientific inquiry into the educational process . . . The failure of the Federal Government to adequately invest in educational research and development has denied the United States a sound foundation of knowledge on which to design school improvements . . . (The) National Educational Research Policy and Priorities Board should . . . work collaboratively with the Assistant Secretary to forge a national consensus with respect to a long-term agenda for educational research, development, dissemination, and the activities of the Office.

As a result of its studies, and its meetings with teachers, educators, researchers, policymakers and others, the Board has reached consensus on four goals that are critical to meet the challenges expressed by Congress in the 1994 legislation. These goals are statements about characteristics of research in education. If the goals were reached, there would be a sound basis for trust in the results and growing support for conduct of research. The Board's goals are:

- Priorities are set and activities are problem-centered.
- High standards of quality are created and upheld.

- Work is collaborative and rigorous.
- Mission is congruent with resources.

The sections below provide additional information about each of these goals and make recommendations for action to achieve them.

Priorities Are Set and Activities Are Problem-Centered

In the Board's work with the Assistant Secretary to establish a priorities plan, and its subsequent efforts to refine and target priorities, it has found that a problem-centered focus for research for developing research agendas works best. That is, identifying real problems faced by teachers in real classrooms is the most understandable way to design and target appropriate research. The principal priority should be teaching and learning and, more specifically, improved achievement for all students. But balanced research agenda setting must also give weight to identification of research opportunities—where research is poised for advances. The targets for action should be ones for which there is reason to be optimistic that research has something important to say, or could have, with the proper investment.

Together, the Board and OERI sponsored a 1998 conference on "*National Directions in Education Research Planning*" that brought together leaders and representatives from a dozen or more research-planning efforts under way among federal agencies, professional and scientific organizations. Its purpose was to put individuals associated with those efforts into communication with one another and with the educators and policymakers who could use the fruits of education research to enhance learning and suggest appropriate priorities and collaborations for current and future work.

The overriding sense of the conference was that educational research planning must emphasize focus and selectivity. The Board heard a consensus among conference participants that education research should be concentrating its inquiries on those areas that the public and the profession believe are important, as well as anticipating problems that will become important. Among the conferees, the appropriate topics were identified as reading and language learning; expanded attention to mathematics; the dynamics of teacher performance

and effectiveness in schools and classrooms; and new emphasis on technology and telecommunications; international studies; and learning in family, community, and workplace settings.

Student Achievement

Members of the Board believe that the focus of research attention must be narrower still, in order to concentrate on something both important and possible.

> *Recommendation 1: Student Achievement*—The priority for research in education must be *high achievement for all students* and, within that domain, the initial emphasis should be on *reading and mathematics* achievement.

Raising student achievement is a priority for education supported alike by parents, business leaders, public officials, and educators. But to *attain* high achievement for all students requires success in combating the most difficult and challenging issues of student performance across America. These are issues sharpened for us once again, recently, by international comparisons from the TIMSS in which both the strengths and the shortcomings in achievement among our youth are apparent. TIMSS data indicate that our younger children, age 9, demonstrate mathematics and science knowledge and skill at levels approximating those of children in other economically developed countries. But as they progress through the school system, they fall farther behind, so that by 12th grade, American students are among the lowest scoring students in the study. Before the TIMSS results were released, we may have been able to take comfort that our most able students ranked with those of other nations, but that has now been disproved as well. The TIMSS results repeated findings from the National Assessment of Educational Progress (NAEP) and other sources, showing that achievement of children from minority backgrounds and from low-income families, on average, continues to lag far behind that of the majority population.

These characteristics of student achievement—that (1) it is below levels experts believe necessary for maintenance and preservation of American democracy and for full participation in a vibrant economy in the 21st century, and (2) that there are unacceptably wide gaps across members of our population—are longstanding and have resisted well-intentioned attempts over many years to remedy. Members of the National Educational Research

Policy and Priorities Board believe that the combined efforts from researchers across several disciplines, developers, and teachers can make a difference if student achievement is the priority.

We have called on the National Academy of Education (the Academy) to provide assistance in forming a research agenda around high student achievement, one that would build on what is already known, and one that would capture the most promising areas for further exploration. The Academy was asked to create a possible agenda on a series of focused research questions. The Academy has suggested three strands of work. The first strand is research on *learning*, especially across *transitions* in children's lives; the second on *teaching in relation to learning* as a professional practice to support student learning; and the third, strengthening the *links between educational research and the practice of schooling*. The first two are discussed in this section on priorities and problem-centered activities. The third is discussed below under collaborative work because it is directed toward constructing more powerful methodologies for conduct of research in education—not only in the area of high achievement for all students, but other topics as well.

The ability of the United States to make substantial progress toward the goal of high achievement for all students is limited by assumptions about the nature of research, learning, and teaching that cause policymakers and practitioners to neglect important complexities associated with education. It is, for example, usually assumed that the results of researchers' investigations should have important practical implications, whether or not the researchers are trying to improve educational effectiveness. Regarding students' learning, students are usually assumed to learn procedures and facts independently of their comprehension of the concepts and principles that make them understandable, and students' learning in school is assumed to occur independently of their abilities and personal identities outside of school. Teachers are assumed to develop skills and subject-matter knowledge independently of the social and cognitive challenges they deal with in their classrooms as they interact with students. In fact, however, the relations among all these factors must be better understood, and to do so, education must be thought of as a complex professional undertaking.

Transitions

In the first strand of its measures for focusing research on high achievement for all students, the Academy has advised us that the most critical and promising research questions fall into two areas. One involves transitions that students

must accomplish in order to progress successfully through the school curriculum. The other concerns transitions that involve the social organization of learning in schools and its relation to the activities of students outside of school.

The Board recommends that research on teaching and learning in school be focused on critical transitions that include important developments in conceptual understanding as students move through the school curriculum, and as they move between the school and other communities. To achieve at high levels, students must succeed in critical transitions that require mastery in general aspects of knowing and understanding that are often not explicitly taught. The expectations in school for these general aspects of understanding and learning do not match with the experiences of all students, and the transitions are much easier for students for whom the school routines and practices are in close alignment with those that prevail at home. The difference is generally unfavorable to students of low-income families.

> *Recommendation 2: Reading, second language learning, and mathematics*—Recent reports from the National Research Council, *Preventing Reading Difficulties in Young Children*, and *Improving Schooling for Language-Minority children: A Research Agenda*, synthesize strong bodies of research knowledge. A similar study on mathematics is currently under way. In each case, research is needed now to analyze how the results of our knowledge can be implemented in school programs and what factors lead to success and difficulties. In reading, research is needed on how students become facile at reading complex text as they transition to advanced academic subjects such as history, social science, mathematics, and science. Research in both short- and long-term effects of specific education interventions for English language learners is needed, as well as techniques of assessment to measure competence, and transition points (a) from the first oral language to English, (b) from oral language to literacy, and (c) from literacy to the academic discourse of specific disciplines. In mathematics, research is needed on why students have so much trouble making transitions (e.g., from concrete objects to abstract ideas), understanding formal representations, multiplicative reasoning, and essential mathematical and statistical concepts such as chance, randomness, and probability.

High achievement for all students will not be accomplished by policies and practices that consider only students' activities in school without taking account

of the competencies that students, especially students from backgrounds of poverty, develop in other aspects of their lives. Several recommendations focus on ways in which the social arrangements of learning in school, as well as the content of school learning activities, need to be studied and understood to inform policies and practices that can lead to high achievement for all students.

> *Recommendation 3*: *Organization for learning out-of-school*—To take advantage of learning environments in which children from impoverished backgrounds often display more competence than in school settings, research is needed to design and test different models of after-school and summer programs to motivate, engage, and benefit low-income children. Work is also needed on types and features of after-school opportunities that most effectively motivate academic achievement and positive self-estimations; and how to design and test different models of collaboration between schools and community groups dedicated to providing strong learning environments for disadvantaged children.

> *Recommendation 4*: *Organization for learning in-school*— Retention, pull-out remediation, tracking, and segregated special education programs that stratify by race, class, and gender opportunities to learn do not result in high achievement for all students. A more complete inventory of knowledge about effective practices for teaching academically challenging curricula with groups is needed, both for school populations in general, and for heterogeneous groups in particular. Research is needed on questions of time for children to master challenging curricula, supportive school structures, and expectations for the breadth and depth of content. Within each of these is the question, do students from middle-income families as well as students from low-income, ethnic, and linguistic minority backgrounds benefit from each organizational practice? An important area of inquiry is whether there are academic benefits to classroom diversity—does diversity improve subject-matter learning? (Note: Recommendation #5 addresses teaching practice aspects of school organization for learning.)

Teaching and Learning

The second strand of research to promote high student achievement in reading and mathematics is teaching as a professional practice. Without improving our

understanding of what it will take to produce a well-prepared and professional corps of teachers, school improvement will not be possible. Students living in poverty and ethnic minorities have been historically underserved by American educational institutions and are an increasingly large proportion of the student population. No one doubts that teachers will have much to learn in the years to come in order to be successful in helping all students reach high levels of achievement. There should be a particular concern with producing new knowledge about connections between professional development and improving education for currently underserved populations; namely, children and adolescents whose experiences and dispositions do not match with the expectations and social organization of schools.

Recommendation 5: Linking changes in teaching practice with improved student learning—Information is needed that can guide teachers and institutions who want to change their educational practice, particularly to reduce inequities in the opportunities of students who differ in socioeconomic status, ethnic background, and gender to learn successfully. This is especially important regarding the achievement of deep intellective competence advocated in current educational reforms. Such research would examine fundamental issues about the nature of teaching and learning, including, but not limited to, the importance of the skills and knowledge of teachers. Expansion is needed in our knowledge and understanding of teaching practices, including teaching tools such as assessment, that are successful with students who bring different cultural resources to their own and to other students' learning. Research would examine, much more than past research has done, issues of what it takes *to do* effective and successful teaching with diverse populations of students. (Note: Recommendation #4 addresses the school organization context in which effective teaching for student learning takes place.)

Recommendation 6: Linking teachers' professional development and teaching practices—Research is needed to understand what effective teachers do and how they do it. Successful teaching involves not only the exercise of skills and application of knowledge but also flexible improvisational adaptation in classroom circumstances. Research is needed to understand the roles of more profound knowledge and comprehension of subject-matter concepts and methods, both at the level one is teaching and in relation to other disciplines and grade levels, as well as the role of

understanding processes of students' learning. Research should also investigate how the structure of teachers' work supports or hinders their "on-the-job" learning and what kinds of abilities are learned in particular situations that can transfer to other settings with different circumstances.

Recommendation 7: Understanding and supporting successful professional development—There is need for a better understanding of teachers' development as "professional learning," and understanding teaching as a "learning profession." The prevalent model of learning how to teach—the knowledge goes in during teacher education or professional development and then comes out to be used in the teachers' own classrooms—does not account for the engagement of teachers themselves in improving the practice of their profession. What teachers need to learn to put reforms in place is not separable from their actual teaching practices or from the development trajectories of their careers. Research must examine ways in which people of diverse cultural, ethnic, and socioeconomic backgrounds are attracted to careers in teaching and how professional development resources can help increase and maintain diversity in the teaching profession, while continuing to improve practice. Further research on teachers' communities of practice is needed, building on findings that norms of responsibility and collegial efforts at professional problem solving are the most critical factors in improvement of teaching and learning.

Assessment

Focusing the research agenda as the Board has suggested means that some important topics will not receive much attention. For example, such areas as cultural and political contexts of schools, educational policy, and school finance; education governance; and learning environments and educational technology—all of them areas in which important work might be done if sufficient resources become available—would not receive significant attention under the Board's view of priorities.

Among all the topics that would be deferred under the Board's identification of priorities to achieve high achievement for all students, one that the Board would single out as *a candidate for inclusion at the earliest opportunity is assessment of teaching and learning for purposes of accountability.*

Accountability is an increasingly important issue in educational research and practice. Current accountability measures, however, do not match the goals of most educational reforms for students of low-income families, especially those reforms aimed at improving their complex thinking and participation in activities of inquiry and understanding. One issue to be considered is the limitations of norm-referenced tests that are conventionally presented in standardized, multiple-choice formats. Criterion-referenced measures, aligned with teaching and learning standards, may assess the competence of these students more productively than norm-referenced tests. Alternative methods that are responsive and valid guides for instruction of students who come from a background of poverty should be developed and studied as soon as adequate funding can be attained.

High Standards of Quality Are Created and Upheld

The single criterion by which any scientific enterprise must be judged is the quality of its work. Scientific norms must be known and shared. The expectations for explicit hypotheses, sound designs, appropriate measures, sufficient data of good quality, and logical analyses must be widely shared. High standards must be insisted upon in all areas of a scientific agency's work—in selection of proposals, design of appropriate methodologies, creation of research agendas, identification of effective and promising practices, and evaluation of all efforts it conducts or supports.

The primary means by which high standards have been developed and assured in federal agencies has been through extensive networks to assure involvement of peers. Peer review is much more than a bureaucratic instrument. It is a major vehicle of communication between the government and the field, a process through which principles about research priorities and technical quality of research are clearly articulated, and applied to proposals. In the 1994 legislation, Congress made its intent clear that a peer system must be applied to every aspect of OERI's work. The law requires:

> that a system of peer review be utilized by the Office—for reviewing and evaluating all applications . . . which exceed $1 million; . . . evaluating and assessing the performance of all recipients of grants; . . . cooperative agreements and contracts; . . . and for reviewing and designating exemplary and promising programs . . .

In addition, the law requires OERI to adopt, and the Board to approve:

> such standards as may be necessary to govern the conduct and evaluation of all research, development, and dissemination activities carried out by the Office to assure that such activities meet the highest standards of professional excellence. In developing such standards, the Assistant Secretary shall review the procedures utilized by the NIH, NSF, and other federal departments or agencies engaged in research and development and shall actively solicit recommendations from research organizations and members of the general public.

While the work of the Board since 1995 has frequently centered on the preparation and approval of those standards, the Board has also undertaken a review of the set that has been in place longest—standards for approval of grants—to determine (a) whether the standards are appropriate and useful; (b) whether they contribute to fair and high quality competitions; (c) how the process worked and how it might be improved; and (d) what recommendations might be made on how to configure and maintain peer review panels.

In this assessment of operation of the standards in fiscal years 1996 and 1997 and in two types of competitions—field-initiated studies and Research Centers—Board members learned that as many as a third of reviewers had not conducted research in education, even though that is a requirement in the standards. Among those who might have had research training and had themselves conducted research, that training and research experience was in broad topical areas related to the competition, but not necessarily in the methods and design of research in the proposals. In examining the reviews provided by OERI panelists, the Board-commissioned study found that most reviews provided little depth in their commentaries. Reviews were most detailed about project design and significance, least detailed on staffing, budget, and management plans. Applicants frequently disagreed with reviewer comments, saw the comments as superficial or irrelevant, found a lack of comments about design, and cited a lack of examples. Applicants also noted limited explanations and mentioned large discrepancies among reviewers. They believed that proposals had not been carefully read and said that comments were illegible.

Standing Panels

As a result of this review, the Board's principal recommendation on research quality is addressed to the establishment of standing panels.

Recommendation 8: Standing panels—Standing panels should be established to review proposals for each OERI Institute. These would be comprised of 25 to 30 members, but with some overlapping membership, so that problems that cross boundaries can receive informed attention and so that members of one panel with special knowledge could be invited to serve on another Institute panel.

This is the Board's most urgent and important recommendation on peer review processes, and it can be implemented by OERI on its own authority both easily and relatively quickly. Standing panels, frequently used by such organizations as NIH, offer the most compelling mechanism the Board could find to improve the quality of the review process. Standing panels provide continuity from the announcement of government funding opportunities to the decisions on proposals to fund. They provide an informed group to build areas of research over time so that the results are cumulative rather than episodic. Such panels can attract experienced members who will agree to serve, because the repeated contacts with colleagues are more professionally rewarding than membership in ad hoc settings. They can provide a forum where the accumulating knowledge can be sifted and interpreted, and new lines of research can be identified.

Thus, standing panels are a device to attract the very people whose judgment is needed to ensure that research proposals are of the highest scientific merit and are addressed to high priority national education needs. They can also play a crucial role in guiding and evaluating the direction of research.

The Board has additional recommendations that complement and support the standing panels.

Recommendation 9: Panel membership—Panels should represent a broad range of perspectives. They must include members with strong disciplinary and methodological expertise. Across OERI's panels, gender, race, ethnicity, and geographic diversity must be respected. Panel members should be nationally recognized figures.

Recommendation 10: Standards for panelists—The Board continues to support peer review standards adopted by OERI, with Board approval, which specify that all reviewers meet three criteria: "(a) demonstrated expertise, including training and experience, in the subject area of the competition; (b) in-depth knowledge of policy

or practice in education; and (c) in-depth knowledge of theoretical perspectives or methodological approaches in the subject area of the competition."

Enhancing Quality in Competitions

The Board has made further recommendations to the Assistant Secretary to enhance the effectiveness of reviewers, reduce workload for reviewers and applicants, and improve center competitions. For all grant competitions, it is important that the quality of research designs be rated by reviewers with appropriate technical expertise. The Board strongly prefers that each proposal be read by a minimum of five people. More logistical and other support should be provided for reviewers along with more in-depth training, and better formats should be created in the technical review form to guide the reviews. Reviewers should be expected to provide specific, but not necessarily detailed, feedback to applicants. Reducing workload for both reviewers and applicants would enhance the likelihood of accomplishing these changes. For example, the Assistant Secretary should consider making grant announcements and appointing submission dates earlier in the fiscal year; reducing the number of full applications through use of preliminary applications; reducing the number of pages permitted for center applications and the page limit for attachments; assignment of specific primary, secondary, and tertiary reviewers to applications; and conduct a small pilot project to determine how technology might be used to support the peer review process.

For center competitions specifically, the Board has urged the Assistant Secretary to clarify the project design criterion so that reviews address the end projects proposed as well as the overall center design; increase weighting for management and clearer instructions; and provide planning grants. These changes require modifications in regulations.

The Board also has recommendations for enhancing peer review processes that may require changes in the 1994 Act.

> *Recommendation 11: Distinguishing between field-initiated and directed competitions*—OERI should distinguish between field-initiated competitions and those that are directed, rather than trying to combine the two.

Recommendation 12: *Funding for peer review*—The allowable percent of funds to support peer review should be increased so that the necessary standing panels may be established and logistical support provided.

Recommendation 13: *Definitions*—The term "research" should have a narrower definition than it has in the 1994 law so that the boundaries of focused competitions for research can be limited. Research should encompass basic research in education as well as investigations, experiments, and inquiry to develop new knowledge or apply tested knowledge. It should exclude development, planning, and demonstrations. The term "national significance" needs to be clarified through regulations or in legislative language so that reviewers understand that it includes research opportunities, not only important problems identified by educators.

Work is Collaborative and Rigorous

Collaborative Research

As noted in section I, the 1994 Act sets the tone for collaboration in all of OERI's work, including that of the Board in its relationships with the Office and the Assistant Secretary. OERI should conduct all its work in ways that bring diverse perspectives constructively together. This includes the perspectives of researchers, educators, policymakers, the public; representatives of the nation's diverse populations and cultures; federal agencies participating in the conduct of education research, as well as states, foundations, and the private sector. To the extent appropriate for each function, this range of perspectives should be represented in all of OERI's activities, from developing agendas, to selection of awardees, oversight, evaluation, and refinement.

OERI has an important place in research in education throughout the Department and across the government. This is defined by Congress in broad terms in the 1994 legislation. For example, the law sets forth a coordination role for the Assistant Secretary and OERI:

> With the advice and assistance of the Board, the Assistant Secretary shall work cooperatively with the Secretary and the other Assistant Secretaries of the Department of Education to establish and maintain

> an ongoing program of activities designed to improve the coordination of education research, development, and dissemination and activities within such Department and within the Federal Government.

The law goes on to specify the goals of minimizing duplication, maximizing the value of federal investment, and enabling entities in education research to interact effectively as partners.

But OERI is limited in its abilities to achieve this role. It provides, for example, only a small part of the total support for education research and development. A study prepared for the Board estimated U.S. spending for research in education in the range of $900 million to $1 billion through the U.S. Department of Education and among foundations. A larger net that includes investments in education studies and data collection in other federal agencies such as the Department of Defense, the Department of Health and Human Services, and the National Science Foundation, as well as state and local governments and universities might add another billion. With a $2 billion level of annual expenditures for education research activities, the nation would be investing less than 0.5 percent of the total enterprise in educational knowledge-building. However, the OERI share represents only about one-fifth of that of the Department and about one-twentieth of the $2 billion estimated national education research investment.

Aside from the level of investment is the question of OERI's span of activities in education research. To be blunt, OERI is only one among several agencies involved in significant support and or conduct of education research. Within the Department, research related to individuals with disabilities and education of children with disabilities is considerably larger. The Department of Health and Human Services conducts research on learning, family structure, integrated service delivery, and funds dissemination activities related to education. The Department of Labor funds research on dropouts and illiteracy, and funds dissemination activities related to education. The National Endowment for the Humanities funds research and dissemination on students' knowledge of history and the humanities. The National Science Foundation has worked on the teaching of math and science, NIH in learning disabilities and reading, and the Office of Naval Research (ONR) in cognitive and neural science and technology.

These simple facts have impressed upon the Board that the almost unbounded role envisioned for OERI in the 1994 legislation creates unachievable ends. OERI is not a monopoly, not the most significant element, not the leading

federal influence in several prominent substantive areas. The reality is that OERI must carefully balance its own initiatives and its collaboration with other federal agencies, foundations, and states and localities.

In the coordination of Department research and in exercise of its authorities for government-wide collaboration, OERI and the Department, nevertheless, have vital strengths that all the government agencies can respect, in that they:

- retain substantial credibility and utility as convenors—they can bring people together;
- maintain unparalleled connections with the nation's educators and education policymakers; and
- support the policy goal of assuring that the nation's education resources are used effectively to provide opportunities to those individuals in our population who have traditionally not been served well.

OERI's strengths can often be used particularly well in combination with complementary attributes of other agencies. The Board makes the following recommendations simply to reinforce the letter and spirit of the 1994 OERI law:

> *Recommendation 14: Collaboration across federal agencies*—The Assistant Secretary should extend efforts to join with other federal agencies, and perhaps foundations, to collaborate on common agendas.
>
> *Recommendation 15: Coordination of research within the Department of Education*—The Secretary should encourage, and the Assistant Secretary should provide, special attention to performing a visible and constructive role in collaboration and coordination of education research within the Department of Education.

The Board does not view these as mere bureaucratic exercises. Every effort should be made to create constructive tasks for which it is to the advantage of all collaborators to join with the Assistant Secretary. Some examples of what the Board members expect might include (1) large areas of research that a single agency would not have the resources to undertake alone, (2) syntheses across important topics such as development or learning in which the research sup-

ported from several perspectives would be tapped, or (3) evaluation of potential future activities so that overlapping agency interests can be avoided or exploited in purposeful ways.

One additional aspect of collaboration needs to be strengthened. The Board has been troubled to find that the relationship between the OERI-supported research and development centers and the regional labs is often distant rather than collegial and mutually reinforcing. There are concerns that in a period of woefully inadequate resources, the nation is reaping less than it could gain from its investment in the two enterprises. In caricature, the centers are sometimes seen as the thinkers and the regional laboratories as interactors with practitioners. But this is out of touch with the realities of how practice will improve and how comprehensive reform is being implemented effectively.

> *Recommendation 16: Linking ongoing research and practice-related efforts*—The Assistant Secretary should develop constructive means through which OERI, the research and development centers, and the regional laboratories can function closely together to maximize their collective impact.

Both the centers and the labs need to be thoroughly grounded in practice realities, while playing complementary and collaborative roles. The centers may emphasize their comparative advantage in broad analysis and conceptual frameworks, while the labs may emphasize integration with practitioner settings. But that is not enough. Both of these sets of institutions, and OERI, should expect a more overarching synthesis of research and the practice of education. OERI should create appropriate mechanisms through which that can be achieved. This might begin as simply as describing functions and tasks of centers and labs, as viewed by the Assistant Secretary, or a description of lab and center work mapped onto OERI/Board priorities.

The Board also wants to associate itself with conclusions from the *National Directions* conference about significant roles for the Board and OERI that emphasize the utility of recommendations 14 and 15. Those conclusions were that the Board and OERI are particularly suited to:

- Convene meetings on educational research planning; and on such underlying issues as standards of evidence and methodological progress. There are, otherwise, no naturally occurring forums for such discussions that transcend specific missions and agendas.

- Encourage and coordinate communications strategies, to place the accomplishments, promise, and challenges of educational research before its professional and public audiences.

- Monitor the educational research system, and build human and institutional resources.

- Build linkages between research endeavors and teachers and other educators in the field, through formal consultations, network building, professional training programs, systematic translation of research findings into program designs, and promising implications for the organization and conduct of instruction.

Synthesis

Finally, the Board has selected one of these conference conclusions for special attention as a recommendation.

> *Recommendation 17: Synthesis activities*—OERI should support synthesis activities across all-important fields of educational research, summing up progress continually and drawing implications for policy and practice.

On balance, the government has devoted more of its attention to making awards of funds for additional research and development than to making the most of what is already known. Synthesis activities can provide a basis for identifying implications of research findings for practice, promising research that might lead toward improved education practice, or potential new research. Some of this work may be especially appropriate for leadership, and even direct conduct, by government staff because of the unique perspectives offered across the Department and throughout the breadth of the government.

OERI Staff

These descriptions of roles for OERI raise an urgent question about the expectations held for OERI staff upon whom these responsibilities will fall. To fulfill its charge as a government research and research support agency, OERI needs staff who can participate as peers in the scholarly community and work with users to facilitate the practical application of knowledge. In other federal research agencies, staff perform significant leadership roles that advance the enterprise, and at the same time attract and retain highly trained and capable

individuals. Among the variety of staff responsibilities that may be found across government research and research support agencies are conduct of research, synthesis of research, collaborative efforts with external stakeholders, planning and design of cutting-edge research, organization of and participation in peer reviews, review of proposals for social utility or agency relevance, and evaluation of ongoing research.

> *Recommendation 18*: *OERI staff*—The Assistant Secretary needs to determine the types of responsibilities most appropriate to accomplish the research functions of OERI, both to advance its work, and also to attract, retain, and continuously nurture staff with the requisite training, knowledge, and capabilities.

Several strategies will be necessary to build staff capacity in OERI. First, additional staff with demonstrated research accomplishments and potential must be attracted. Second, intensive professional development opportunities are needed for existing staff, including support for graduate study, details to other scientifically oriented research agencies, and newly energized employee development in the workplace, as, for example through mentoring, in-house seminars, and group projects. Third, staff with generalist skills may need to be reassigned to other areas in OERI or in the Department where their experience can be better used.

Design for Rigorous Research

The *National Directions* conference participants also concluded that hand-in-hand with a sense of focus and collaboration in research must come emphasis on more rigorous methods and designs, with particular attention to: (a) rethinking, reimagining the possibilities of experimental field trials given new technical tools, the complexity of the puzzles that must be unraveled, and the persuasive power of randomized trials with policymakers and the public; (b) design processes or "engineering" that systematically apply insights of research to the development of discrete education programs; and (c) creating a universe of reliable syntheses of all important areas of educational research.

Following these conclusions from the *National Directions* conference, OERI would fit between the research community, the political community, and the world of practice. It would not only undertake research and related work for which it is especially suited, it would assist all agencies, associations, institutions, and individuals involved in educational research and improvement to add

more value to their own work and to the joint endeavor of learning. The goal can be clearly stated: in the future, all education must be based on ideas that are subject to validation or invalidation by well-designed, well-executed research, and translated into success by well-qualified professionals.

The National Academy of Education included in its advice to the Board a strand on the design of research in education. The Academy's advice began with observations on the usual connotation of "research" and "practice" in education research. Historically, the relation between research and practice in education has been troubled. The field of education does not have a strong, well-established professional community that takes as its charge the design and development of practice-relevant theory, products, and procedures based on established scientific principles and data. There are important examples of such design and development work, but it does not occupy a sufficiently stable and extensive community of researchers and developers. The field does not include a sufficiently established institutional home, form of professional identity, or set of incentive structures that can be called on to support sustained attention to a continuing, integrated set of activities aimed at solving pressing educational problems and developing sound educational theory.

Worst of all, education lacks a well-established tradition of mutual accountability between education research and practice. There are examples of collaborations in which researchers and professional educators join in shared accountability for educational improvement and advancing research, but these are exceptional. In most cases, researchers are expected to study important educational questions, but their work is judged almost entirely by its quality as research; the relevance of the work to the details of education practice is secondary, despite frequent attempts to document some kind of "impact." On the other side, knowing research, seeking it out, and acting in accordance with its results (even when these results challenge some traditional and favored ways of doing things) are exceptional rather than normative behaviors for working educators. Furthermore, regarding contributions to the research literature, professional educators are generally viewed, by themselves as well as by researchers, as the objects of study, rather than as participants in constructing knowledge and understanding general principles.

This situation is not new. The history of OERI and its predecessors (the National Institute of Education, and the U.S. Office of Education within the Department of Health, Education, and Welfare) is in part a tale of trying to establish, nurture, and sustain a more productive relationship between

research—the source of a reliable knowledge base for education improvement—and educational practice. The conceptual basis for much of this work, the Research-Development-Dissemination-Evaluation (RDDE) model, however, embodies a set of assumptions about the way in which research and practice should interact that the National Academy of Education, as well as members of the Board, question.

In the past, researchers typically have taken responsibility for producing new knowledge that relates to some aspect of learning, pedagogy, or schooling and for disseminating that knowledge through the traditional academic venues of scholarly journals and meetings. Others, often education practitioners, have assumed the responsibility for designing educational products and programs, sometimes based on research data but more typically based on experience and intuition, in response to specific problems. Pressures to be pragmatic and move on to the next problem often mean that practitioners devote little time to analyzing how their programs work or how they may be useful in other settings.

There is a second dimension of the lack of connection between what we know and what we do with what we know. No matter how research is conducted, through surveys or ethnographic methods or "design experiments," we need to develop better strategies to ensure that research findings will have a wider impact in schools and communities with significant numbers of low-income students. For the most part, we have treated the intersection of research and practice as one in which researchers transmit the products of research to practitioners. This situation is ironic, for we know that the transmission model does not work for the education of children. So why, then, do we think it should work for interactions with teachers?

The RDDE approach to research and practice has proven to be unproductive and myopic. When researchers take little or no responsibility for making things work and practitioners eschew development of explanatory systems for how and why things work or do not work, neither research nor practice benefits. Without a sense of mutual obligation to one another, researchers and practitioners continue in their own worlds, talking past rather than to one another.

Problem Solving

The Academy's analysis concluded with concrete ideas for a new design for "problem-solving" research in education, and the Board's recommendations are built from that advice.

Recommendation 19: Collaborative problem-solving research and development—OERI should begin development of a new design for research that would focus explicitly on solving specific current problems of practice and, at the same time, be accountable for developing and testing general principles of education that can "travel" to locations beyond those in which the research is done. The central idea is to develop a system of support for projects in which professional researchers and professional educators share in the accountability for achieving success in improving educational practices and outcomes. These projects may also include program developers, curriculum specialists, or policy specialists. Initially, this effort might be launched through a "working group" to assist in designing the details about specific parts of the priority research agenda for which this model would be best suited, the role of OERI and outside contractors or grantees, coordination across multiple sites, expectations as to scale and length of commitment and the like.

Board members believe that this proposal will provide powerful new means through research and development to grapple with some of the most persistent and deeply ingrained problems of our day, and especially the ones contained within the Board's priority for high achievement for all students. All the participants in collaborative problem-solving research and development would share in a commitment to and accountability for multiple outcomes of this approach. These will include: (1) tangible improvement of participating education systems, responsive to the circumstances of those systems and demonstrated by documentable criteria; (2) development of materials, personnel, and other resources to support transport of the aims, operational concepts, and methods that are developed in the project to other sites; and (3) contributions to the research literature that document the results of these efforts and allow for alternative explanations of them, so that the results of these projects will advance society's understanding of educational practices and purposes.

The novelty of this recommendation is in the shared goals and accountability for them by all of the participants, rather than separating responsibilities of teachers, developers, and researchers. This is not recommended as a replacement of support by OERI for other basic research or applied research and development activities. Rather, Board members believe that this kind of integrated work should be added to the program of activities supported by OERI and should be closely allied with both fundamental and applied research, which the Department should continue to support vigorously.

Balanced Role

In summary, the strategic role that the Board sees for OERI cannot overemphasize the unique position the Office can occupy in the realm of research aimed at improving educational practice and policy. The territory bounded on one end by core learning processes identified in cognitive neuroscience, and bounded on the other by the engineering of educational improvement, is vast and complicated. Whereas OERI can enter into collaborative ventures with NICHD and NSF in the realm of the basic science of learning, OERI should lead in developing knowledge about learning connected to the real world of classrooms, schools, communities, and policies. Moreover, it should also take the leading role in engineering and evaluating reforms as they begin to affect children. This work is ideally situated in OERI, given its strong relationship with the fields of practice and policy, for if reforms do not ultimately reach teachers and the act of teaching, an impact on children is highly improbable.

In the Board's view, OERI would sometimes initiate an agenda and sometimes collaborate with agencies such as the NSF in science and mathematics education, NIH in reading, or ONR in learning. This dual role of initiative and collaboration would provide ways to extend the depth and purpose of those things that OERI undertakes itself, yet tap some of the strong research designs that have been followed in other organizations, while building on OERI's excellent connections with the practice community and its ability to establish appropriate contexts. The whole would be more than the sum of the parts.

Mission Is Congruent with Resources

The ideal education research system would assure congruence between mission and resources. It would build capacities for quality and critical mass, recognizing that any lesser goal will reduce credibility and support for the efforts. In reaching for this objective, the system would recognize the importance of both incremental development and firm long-range plans. As its capability grows, OERI will substantially increase its technical expertise and outreach, always including the skill to capture and integrate fundamental work wherever it is conducted and undertake leadership where no superior source exists.

The current situation does not resemble this ideal. Instead, the Board has found longstanding problems from insufficient aggregate resources in OERI, noted above. Too few resources have led to spreading available ones thinly over a large number of topics and problems. OERI has created and nurtured three major types of institutions over a period of three decades—research and devel-

opment centers, regional educational laboratories, and ERIC research information centers—each with multiple sites. The resources to make these many institutions fulfill the roles for which they were created are extremely constrained. Funds for field-initiated studies and new research initiatives have often been negligible or non-existent.

> *Recommendation 20: Funding for research in education*—Funding for education research must be increased dramatically. An interim target should be the level proposed by the President's Committee of Advisors on Science and Technology of 0.5 percent of our nation's expenditures for elementary and secondary education—about $1.5 billion annually. This would be a feasible target to reach over a 5-year period.

There is no investment in education that the federal government might make that is of equal importance to research. Education research has demonstrated over and over again that it can provide useful answers for education practice and policy. It is the most vital strategy for lifting student learning to the levels we must achieve to maintain our democracy and its vibrant economy into the 21st century.

> *Recommendation 21: Aligning resources and mission*—Over the next 5 years, OERI should work to make the resources and the missions better aligned. Mission must be matched with money.

If more resources are not forthcoming, the mission-resource mismatch will have corrosive and cumulative consequences. The extensive prescription of organizational features within OERI may need to be reconsidered if funds are insufficient, and in that event, it would be prudent if the Secretary had authority to modify the organizational structure.

Effective use of resources does imply a careful consideration of use of OERI staff and internal oversight of research. The Board notes that issues of quality across the agency, coordination of work internally and collaboration externally, and the substantive development of the research agenda are among issues that call for continuing supervision, mentoring, and quality review. It would be highly desirable to build into OERI the means for stabilizing a professional research function that offers some insulation from constant changes in leadership and course of direction, even appearances of politically inspired or ideological research agendas.

Recommendation 22: *Research supervision*—Some focal point should be created by Congress for research leadership that can span across administrations.

In addition to generally insufficient funding, the allocation of resources for OERI, particularly to and by the institutes, is heavily controlled by statutory and other distribution rules. These rules frustrate responsiveness to new needs and circumstances, fractionate limited funds, and inhibit response to new national priorities. In a well functioning system, these rules should not be necessary.

Recommendation 23: *Allocation requirements*—The allocation provisions in the 1994 Act for institutes and for types of support should be removed.

IV. Concluding Observations

To supplement its recommendations for research in education, the Board has some concluding observations about its own work, and particularly about how it can best be effective. The legislation that created the Board contains numerous references to "collaboration." In addition, the Board is required by law to "review regularly, evaluate and publicly comment upon" actions of the administration and Congress. Among provisions of the law is one that says the Board must be offered an opportunity to provide written comments on any proposed "grants, contract, or cooperative agreements" over $1 million, and those comments may cover both consistency of the proposed use of funds with the research priorities and the "methodology and approach of the proposed actions."

Taken together, these are potentially powerful authorities, although they must be exercised in balance with the resources the Board has available or can attain. On one occasion when appropriations exceeded the administration's budget request, the Board was invited to provide an overall analysis and make recommendations prior to Department decisions about use of these appropriations. The Board believes that was an especially effective interchange between the administration and the Board and one that permitted the Board to be both constructive in its comments and effective in its influence over the subsequent actions. However, there have been other occasions, such as preparation of the President's budget and the administration's proposals for a national voluntary test, on which the Board's involvement came not only after the decisions were made but after public debate had begun. These latter examples do not seem to demonstrate the collaborative relationship that the law seeks to establish. Even worse, perhaps, they fail to take advantage of the counsel the Board was created to provide. It is just that structure and those processes that the Board has used to prepare this policy statement. This is one concern.

Of greater importance, however, is the view of Board members that much has been accomplished during the past 4 years to serve as a platform for the future. The members have learned to work through the diversity of views that Congress wisely insisted be represented among the appointees. All have come to appreciate the potential of sound research in education as a means through which all American students can become better prepared for their lives in a new millennium.

Members of the National Educational Research Policy and Priorities Board appreciate the opportunity that Secretary Riley provided them through appointment to the Board to serve American education. They are committed to perform, and eager to continue, their special functions in policy and priority setting for education research.

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